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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,451	09/19/2003	Wen-Chuan Wang	N1085-00160	7285
54657 7590 01/17/2007 DUANE MORRIS LLP IP DEPARTMENT (TSMC) 30 SOUTH 17TH STREET PHILADELPHIA, PA 19103-4196			EXAMINER DOAN, NGHIA M	
			ART UNIT 2825	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/17/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

**Application No.**

10/665,451

**Applicant(s)**

WANG ET AL.

**Examiner**

Nghia M. Doan

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/30/2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 12-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. Responsive to communication application 10/665,451 filed on 09/19/2003 and Applicant Amended filed on 11/30/2006, claims 1-22 are pending.

Claims 1, 6, and 8 have been amended.

Claims 12-22 have been withdrawn, but have not been canceled. Applicant is/are advised to cancel these in the next communication.

The replaced abstract is accepted.

Applicant's arguments, filed on 11/30/2006, with respect to the claim rejection under 35 U.S.C 112 for claims 1, 6, and 8 have been fully considered and are persuasive. The claim rejection under 35 U.S.C 112 first and second paragraph of claims 1, 6, and 8 has been withdrawn.

Applicant's arguments filed on 11/30/2006, with respect to the claim rejection under 35 U.S.C. 102(b) based on Pierrat and/or Garza references have been fully considered but they are not persuasive. Therefore, The claim rejection under 35 U.S.C. 102(b) is maintained.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Pierrat et al. (hereinafter as "Pierrat") (US Patent 6,272,236).

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4. With respect to claims 1 and 6, Pierrat discloses a method and system for inspection photomasks employs simulated image of the resist pattern (*the Abstract*) comprising:

generating a mask picture (*mask pattern*) from a first mask, the first mask being made from a predetermined mask design (*figure 1, element [mask 161]*) with a first OPC model (*resist behavior*) (*figure 5, element [330] and see it's description details*) applied thereto (*figure 1, element [130], col. 5, ll. 8-27; figure 3, steps [210 and 220], col. 3, ll. 44-50*);

converting the mask picture into a simulation required mask file (*taking an image from the mask and digitizing it using conventional mask inspection equipment*) (*figures 3, step [230], col. 7, ll. 51-54; figure 5, element 335, and see its description details*);

conducting a first simulation under a first set of predetermined photolithography processing conditions using the simulation required mask file to generate one or more files of a first set representing a first wafer photo resist profile thereof (*figure 1, element [180], col. 5, ll. 29-44; figure 3, steps [240, 250, 260], col. 7, ll. 54-67 and col. 8, ll. 1-10; and figure 5, elements [345, 450] and see its description details*);

applying the first OPC model to the predetermined mask design in a database mask file format (*figure 1, element [150], and col. 8, ll. 18-24*), thereby generating an OPCed mask design (fig. 3, step [230], col. 8, ll. 25-32);

conducting a second simulation under the first set of predetermined photolithography processing conditions using the OPCed mask design to generate one or more files of a second set representing a second wafer photo resist profile thereof

*(figure 1, element [185]; figure 3, steps [255 and 265], col. 8, ll. 4-10 and ll. 35-46; and figure 5, elements [315, 320] and see its description for detail ); and*

*comparing the first and second sets of files (figure 1, element [140], col. 7, ll. 8-16; figure 3, step [270], col. 8, ll. 11-17 and ll. 47-52; and figure 5, element [360]).*

5. With respect to claims 2 and 7, Pierrat discloses all the limitations of the forth set claims. Pierrat also discloses wherein the comparing includes setting one or more thresholds of the wafer photo resist profile for rejecting the first OPC model used (*col. 5, ll. 60-67 and col. 6, ll. 1-10*);

6. With respect to claim 3, Pierrat discloses the method of claim 1 further comprising repeating all the steps by replacing the first OPC model with one or more other OPC models in the second simulation to determine a preferred OPC model to be used for generating the physical mask (*figure 1, col. 5, ll. 4-7 and figure 2, col. 6, ll. 52-67 and col. 7, ll. 1-41*).

7. With respect to claims 4 and 9, Pierrat discloses all the limitations of the forth set claims. Pierrat also discloses wherein the files of the first and second sets includes two-dimension wafer resist profile simulation files (*figures 1, 3, 5 and see their description; col. 5, ll. 45-60 and col. 8, ll. 33-35*).

8. With respect to claims 5 and 10, Pierrat discloses all the limitations of the forth set claims. Pierrat also discloses wherein the files of the first and second sets includes three-dimension wafer resist profile simulation files (*figures 1, 3, 5 and see their description; col. 5, ll. 45-60*).

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9. With respect to claim 8, Pierrat discloses the system of claim 6 wherein the comparison tool further includes means for detecting non-OPC related errors (*other defects*) (*col. 1, ll. 44-62, figure 5, element [332]*) related to photolithographic processes (*col. 8, line 62 – col. 9, line 2*).

10. With respect to claim 11, Pierrat discloses the system of claim 6 wherein the files of the first and second sets further includes aerial images (*col. 5, ll. 8-27*).

11. Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Garza et al. (hereinafter as "Garza") (US Patent 6,078,738).

12. With respect to claims 1 and 6, Garza discloses a method and system for simulating of masking process characterization (*the Abstract*) comprising:

generating a mask picture from a first mask, the first mask being made from a predetermined mask design (*a digital representation of a patterned mask and a data set*) with a first OPC model (*mask pattern that would be produced by masking process using patterned mask under conditions specified by said data set*) applied thereto (*col. 3, ll. 28-38; col. 8, ll. 63-67; col. 9, ll. 1-3; and claim 1, col. 9, ll. 58-67*);

converting the mask picture into a simulation required mask file (*col. 3, ll. 39-40; col. 9, ll. 3-6; and claim 1, col. 10, ll. 1-2*);

conducting a first simulation under a first set of predetermined photolithography processing conditions using the simulation required mask file to generate one or more files of a first set representing a first wafer photo resist profile (*first database*) thereof (*col. 3, ll. 40-42; col. 9, ll. 6-10; and claim 1, col. 10, ll. 3-4*);

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applying the first OPC model to the predetermined mask design in a database mask file format (*col. 3, ll. 42-45; col. 9, ll. 10-14; and claim 1, col. 10, ll. 5-7*) thereby generating an OPCed mask design (*col. 6, ll. 58-61 and col. 9, ll. 3-14*);

conducting a second simulation under the first set of predetermined photolithography processing conditions using the OPCed mask design to generate one or more files of a second set representing a second wafer photo resist profile (*second database*) thereof (*col. 3, ll. 45-47; col. 9, ll. 14-21; and claim 1, col. 10, ll. 8-9*); and

comparing the first and second sets of files (*comparing said first database and second database*)(*the Abstract; col. 3, 47-49; col. 9, ll. 24-26; claim 1, col. 10, ll. 10-12; and including figure 7, step [218]*).

### ***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garza et al. (hereinafter as "Garza") (US Patent 6,078,738) in view of Pang (US Pub. 2004/0172611).

15. Garza discloses all the limitations of the forth set of claims. Additionally, Garza also teaches that the process of simulator is modified based upon the error database to minimize the differences between a successive iteration of the aerial image and the

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pattern, but Garza does not implicitly teach setting one or more thresholds of the wafer photo resist profile for rejecting the first OPC model used.

Pang teaches a method of mask defect inspection impact during the transfer of a mask process of including generating a simulated wafer image have the accuracy of a resist model with the speed of an optical model by using a threshold look-up table (LUT). This threshold LUT can be created by performing a one-time simulation of a test layout with different parameter using a resist model (*Pang, paragraphs [0015-0018]*).

16. It would have been obvious to one of ordinary skill in the art to combine Garza and Pang teachings of using optical model and the threshold look-up table to simulation the aerial image for improving accuracy of the wafer simulation results (*Pang, paragraphs [0013, and 0020]*).

#### ***Examiner Remarks***

17. Applicant's arguments filed on 11/30/2006 have been fully considered but they are not persuasive. Therefore, the claim rejection is maintained.

#### **Pierrat's reference:**

18. Applicant state "nothing in the description or drawings of Pierrat shows making mask from a predetermined mask design with an OPC model".

Examiner respectfully disagree as the following reason:

19. Pierrat does disclose a method of making mask from a predetermined mask design with an OPC model, such as figure 1, pattern database [150], which is a predetermined mask design with an OPC model, which is used in second image simulation [185] that makes a comparison with a first image simulation [180]. Moreover,

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figure 3, step [220], emphasizes that "manufacture photomask using original pattern data". Hence, Pierrat read on all limitations of claimed invention.

Garza's reference:

20. Applicant state "Neither the first data nor second database of Garza is generated from simulating photolithography processing conditions using an OPCed mask design which is generated based on an OPC model".

Examiner respectfully disagree as the following reason:

21. Garza does disclose the first data and second database of Garza is generated from simulating photolithography processing conditions (at least col. 2, ll. 8-33, col. 3, line 64 – col. 4, line 9, and col. 10, claim 3, ll. 28-38) using an OPCed mask design which is generated based on an OPC model (*mask pattern that would be produced by masking process using patterned mask under conditions specified by said data set*)(col. 4, ll. 45-50, col. 6, ll. 51-61, and col. 8, ll. 51-55), which is using for compensating the discrepancies between pattern and the photomask (col. 2, ll. 34-51).

Hence, all the citations above in Garza reference read on all limitations of claimed invention.

22. Moreover, claims 2 and 7 are depending on claims 1 and 6, which are anticipated by Garza. Further, claims 2 and 7 are obvious by Garza in view of Pang.

23. As all the citations above for each limitation of claimed invention, Pierrat and/or Garza in view of Pang read on the all the limitations. Therefore, the claim rejection is sustained.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

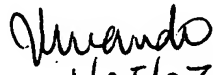
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nghia M. Doan whose telephone number is 571-272-5973. The examiner can normally be reached on 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Chiang can be reached on 571-272-7483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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